

# REMARKS

Applicants have amended claim 19, and now address the Examiner's points raised in the above-identified Office action as follows:

## I. Rejection of Claims Under Section 102 or 103 Based on Fang and Ametek

Claims 1, 2, 4, 5, 7, 11 to 15, 17 to 21, 25 to 27, 32, 33, 37, and 41 to 44 have been rejected under 35 U.S.C. § 102 as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103 as allegedly being unpatentable over Fang in view of Ametek.

Applicants' claimed invention is a two-phase material comprising a first phase of grains (e.g., WC) that are bonded together with a second phase of binder alloy. The binder alloy used to bond the grains together is one formed from a blend of different materials that are specifically selected to provide a coefficient of thermal expansion that closely matches that of the first phase of grains. The claims further quantify the thermal expansion parameter as being one that is less than about 10 ppm/°C within a temperature range of from 100 to 700°C.

A first point of departure from Fang is that the material construction of Fang involves a three-phase arrangement of different material phases, where Applicants' claimed

composition involve only a two-phase material arrangement. The Fang construction involves first the formation of a particle having two material phases (e.g., a hard phase and a binder phase), and then the placement of the particle in a further second binder phase. Fang discloses that this second binder phase (i.e., not the first binder phase used to bond the hard grains to form the particles) can be formed from a low CTE alloy material. It is important to note that this second binder phase is not even present in Applicants' claimed composition.

The use of a low CTE alloy material in Fang is directed to improving the thermal expansion compatibility between the particles (e.g., formed from cemented tungsten carbide) and the continuous matrix binder phase surrounding the same. Contrast this with Applicants' claimed material composition where the low CTE binder alloy is used to bond together the hard phase grains themselves (e.g., the two material phases used to form the particles in Fang).

Applicants' invention is structurally distinguishable from Fang because it was developed to address an issue that is different than that of Fang; namely, improving the thermal expansion compatibility between the hard phase grains and the binder phase bonding the same together. Again, while Fang deals with the particles and a surrounding matrix, Applicants'

invention deals with the hard phase grains and binder that are combined together to form the particles.

With this background in mind, the Examiner notes in rejecting the claims that Fang discloses a cermet material comprising "a WC hard phase; and a binder phase of Fe-Ni-Co alloys." While Fang does disclose particles comprising a WC hard phase and a binder phase bonding the hard phase grains together, the passage in Fang relied upon by the Examiner relating to the binder phase alloy is one that is descriptive of the second binder phase that is used to bond the particles (formed from the WC grains and first binder) together. The Examiner further notes that Fang discloses that the binder phase have a low CTE. Again, this is true with respect to the second binder phase in Fang that is used to surround the particles. However, Fang does not disclose or suggest that the binder phase used to form the particles have a low CTE.

Fang does disclose that the first binder can be formed from Co, Ni, Fe, alloys thereof, and alloys with materials selected from the group consisting of C, B, Cr, Si and Mn. However, Fang fails to disclose or suggest that the first binder have low CTE properties, and does not provide any motivation or suggestion to one having ordinary skill in the art on how to possibly combine or selected these different materials to obtain low CTE properties. Much less, one having a very specific CTE of

less than about 10 ppm/°C within a temperature range of from 100 to 700°C as claimed.

Again, however, this is not surprising given the fact that Fang was concerned about obtaining thermal expansion compatibility between the particles and the surrounding second binder phase, not about obtaining thermal expansion compatibility between the hard grains and the first binder used to form the particles themselves.

For these reasons, Applicants submit that its invention as recited in independent claims 1, 14 and 33 (and the claims depending respectively therefrom) are not properly anticipated under 35 U.S.C. § 102. Additionally, Applicants submit that one having ordinary skill in the art would not be motivated by Fang to use the CTE binder alloy, disclosed for surrounding the particles, to replace the binder used to bond together the hard grains used to form the particles. Thus, Applicants submit that its invention as recited in independent claims 1, 14 and 33 (and the claims depending respectively therefrom) is not obvious and unpatentable under 35 U.S.C. § 103. Applicants respectfully request that this basis of rejection be reconsidered and withdrawn.

The Examiner has also relied on the Ametek tech brief. While Ametek does shed some light on the material composition of the Sealvar formulation, it fails to disclose or suggest any

thermal expansion of this material, and further fails to disclose or suggest the possible use of the material to form a cermet material having improved properties of thermal expansion. Further, since Ametek fails to disclose or remotely suggest the use of its material to form a cermet, it is not therefore surprising that Ametek also fails to cure the above-discussed shortcoming of Fang, i.e., it does not disclose using the Sealvar material as the binder alloy for joining together the hard phase grains.

For these reasons, Applicants submit that Ametek does not properly anticipate Applicants' invention as recited in claims 1, 14 and 33 (and the claims depending respectively therefrom) under 35 U.S.C. § 102. Additionally, Applicants submit that one having ordinary skill in the art would not be motivated by the combination of Ametek with Fang to use the Sealvar formulation to join together the grains (rather than join together the particles formed from the grains as taught by Fang). Thus, Applicants submit that its invention as recited in independent claims 1, 14 and 33 (and the claims depending respectively therefrom) is not obvious and unpatentable under 35 U.S.C. § 103. Applicants respectfully request that this basis of rejection be reconsidered and withdrawn.

With respect to the rejection of independent claims 25 and 43, Applicant submits that neither Fang nor Ametek alone or

in combination, disclose the three phase material recited in claim 25 (comprising the low CTE second phase binder alloy) or the cermet composition comprising the ordered microstructure recited in claim 43 (comprising the low CTE second phase binder alloy). For this reason, Applicants submit that its invention as recited in independent claim 25 and 43 (and the claims depending respectively therefrom) is not anticipated under 35 U.S.C. § 102 based on Fang or Ametek, and is not obvious and unpatentable under 35 U.S.C. § 103 based on Fang and/or Ametek. In view thereof, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 102 and § 103 be reconsidered and withdrawn.

II. Rejection of Claims Under Section 103 Based on the `654 patent and the `125 patent

Claims 1 to 4, 7, 11, 12, 14 to 17, 19 to 21, 43 and 44 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the `654 patent in view of the `125 patent. Applicants' claimed invention is a two-phase cermet material as recited above in Section I.

The `654 patent discloses a cemented carbide that is formed by mixing carbide particles with an alloy consisting of Ni, Co, C and Fe for the purpose of achieving a property of unusually high abrasion resistance. As noted by the Examiner,

the `654 patent fails to disclose or suggest the use of Mn, which element is recited as being included in Applicants' claimed low CTE binder alloy.

The `125 patent discloses tungsten carbide compositions that are prepared using a non-cobalt metallic alloy. In an example embodiment, the metallic alloy includes Ni, Mn, C and Fe. The Examiner relies on the `125 patent for its use of Mn in forming its alloy and alleges that from such use it would be obvious to one of ordinary skill in the art to take the Mn and the `125 patent and add it to the `654 patent alloy to achieve a binder alloy comprising all of the combined elements of Applicants' claimed low CTE binder alloy.

Applicants submit that this simplistic approach is not suggested or supported by the combination of the `125 and `654 patents. The `125 patent discloses the formation of metallic alloys that are alternatives to conventional Co alloys. The `125 patent expressly notes that the compositions provided using the metallic alloys that disclosed therein (i.e., that purposefully do not include Co) exhibit a "relatively higher overall toughness than ones bound with a conventional cobalt matrix." The `125 patent makes clear its intent that the metallic alloy disclosed therein is a replacement for conventional WC-Co materials.

Mn is used in the `125 patent metallic alloy formulation to assist in forming a resulting tungsten carbide material having the desired hardness property.

One having ordinary skill in the art aware of the `125 patent would not be motivated to pick and chose among the different elements (Ni, Mn, C, and Fe) used to form the metallic alloy for the purpose of combining it with a binder alloy that includes Co, as this would be counter to the teaching of the `125 patent. As noted above, the `125 patent in fact teaches away from such a suggestion. There is nothing in the `125 patent that even remotely suggests that the benefits gained by using Mn in forming the metallic alloy in the `125 patent would be present when Mn was used with a Co-containing binder material.

Accordingly, Applicants submit that one having ordinary skill in the art would not be motivated by the combination of the `654 patent and the `125 patent to formulate the low CTE binder alloy as recited in Applicants' independent claims 1, 14 and 33. In view thereof, Applicants respectfully request that the rejection of independent claims 1 and 14 (and the claims depending respectively therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

With respect to the rejection of independent claim 43, Applicant submits that neither the `654 patent nor the `125 patent alone or in combination, disclose the cermet composition



comprising the ordered microstructure as recited in claim 43 (comprising the low CTE second phase binder alloy). For this reason, Applicants submit that the invention as recited in independent claim 43 (and claim 44 depending therefrom) is not obvious and unpatentable under 35 U.S.C. § 103 based on the combination of these two patents. In view thereof, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

III. Rejection of Claims Under Section 103 Based on the `654 patent, the `125 patent, the `301 patent, Liang, and Fang

Claims 13, 33, 34, 37, 41 and 42 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the `654 patent in view of the `125 patent, and further in view of the `301 patent, Liang, and Fang. Applicants' claimed invention is a two-phase cermet material as recited above in Section I.

The Fang patent was discussed in Section I, and the `654 patent and `125 patent were each discussed in Section II of this response.

The `301 patent discloses a gage protection for rock bits and has been relied upon for its disclosure of cemented carbides formed with Co, Ni, and/or Fe binder for use as inserts in a rock bit. However, the `301 patent fails to disclose or remotely suggest Applicants' cermet composition discussed above

and as recited in independent claims 1 and 33. For this reason, the further addition of the `301 patent does not operate to cure the shortcomings of Fang, the `654 patent, and the `125 patent as pointed out in Sections I and II of this response. Therefore, the further addition of the `301 patent (also including such shortcoming) to this group of patents cannot operate to render Applicants' invention as recited in these claims obvious.

Liang discloses a thermal, fatigue, and shock resistant material for earth-boring bits, and is apparently relied upon by the Examiner for its disclosure of WC-Co materials for use as a cutting element on a drill bit. However, Liang also fails to disclose or remotely suggest the Applicants' cermet composition discussed above and as recited in independent claims 1 and 33. For this reason, the further addition of the Liang does not operate to cure the shortcomings of the `301 patent, Fang, the `654 patent, and the `125 patent as pointed out in Sections I and II of this response. Therefore, the further addition of Liang and the `301 patent (both including such shortcoming) to this group of patents cannot operate to render Applicants' invention as recited in these claims obvious.

In view thereof, Applicants respectfully request that the rejection of these claims depending from the above discussed independent claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

IV Rejection of Claims Under Section 103 Based on the `654 patent, the `125 patent, and Fang

Claims 25 to 27 and 29 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the `654 patent in view of the `125 patent and Fang. For the reasons presented above in Sections I (with respect to Fang) and Section II (with respect to the `654 and `125 patents), Applicants submit that its invention as recited in independent claim 25 is not obvious in view of the combination of Fang with the `654 and `125 patents (each including the shortcomings of not disclosing a three-phase cermet composition comprising the low CTE second phase binder alloy). In view thereof, Applicants respectfully request that the rejection of independent claim 25 (and the claims depending therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

V. Rejection of Claims Under Section 103 Based on the `654 patent, the `125 patent, and Heinrich

Claims 5 and 18 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the `654 patent in view of the `125 patent and Heinrich. For the reasons presented above in Section II, Applicants submits that its invention as recited in independent claims 1 and 14 are not obvious based on the combination of the `654 and `125 patents.

Heinrich discloses a cermet insert comprising a Co-Ni-Fe binder, wherein such binder was developed to replace a Co only binder for the purpose of avoiding problems due to the unavailability of Co, and providing improved corrosion resistance. While Heinrich does disclose the use of a binder comprising Co, Ni and Fe, Heinrich fails to disclose or suggest the additional use of C and Mn to form the binder as recited in Applicants' claims. Further, Heinrich discloses that such binder comprise "at least about 40 percent by weight cobalt." Thus, Heinrich fails to disclose or suggest a binder alloy as recited in Applicants' independent claims 1 and 14 comprising 10 to 30 percent by weight cobalt.

In view of the above, Applicants submit that one having ordinary skill in the art would not from the combination of these patents (having the above-identified shortcomings) arrive at Applicants' cermet composition as recited in independent claims 1 and 14. Applicants, therefore, submit that its cermet composition as recited in these claims is properly patentable over the combination of these patents, and respectfully request that the rejection of claims 5 and 18 (depending respectively therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

VI. Conclusion

For the reasons presented above, Applicants respectfully request that the rejections of claims under 35 U.S.C. § 102 and § 103 be reconsidered and withdrawn, and that claims 1 to 5, 7, 11 to 21, 25 to 27, 29, 32 to 34, 37, and 41 to 44 be passed to allowance. If, after evaluating this response, the Examiner does not believe that the claims are in allowable condition, Applicants respectfully request that the Examiner please contact its below-identified patent attorney for the purpose of discussing the same.

The proceedings herein are for a patent application and the provisions of 37 C.F.R. 1.136 apply. Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

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If any additional fees are necessary in this matter, please  
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Respectfully submitted,

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